



NDIA Systems Engineering Conference

Program Support: Perspectives on Technical Planning and Execution

Dave Castellano

Deputy Director, Systems Engineering

DEFENSE SYSTEMS

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Technology and Logistics**

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Top Five Systems Engineering Issues*

- Lack of awareness of the importance, value, timing, accountability, and organizational structure of SE on programs
- Adequate, qualified resources are generally not available within government and industry for allocation on major programs
- Insufficient SE tools and environments to effectively execute SE on programs
- Requirements definition, development, and management is not applied consistently and effectively
- Poor initial program formulation

*** Based on an NDIA Study in
January 2003**



Recap: What We Have Done To Revitalize Systems Engineering

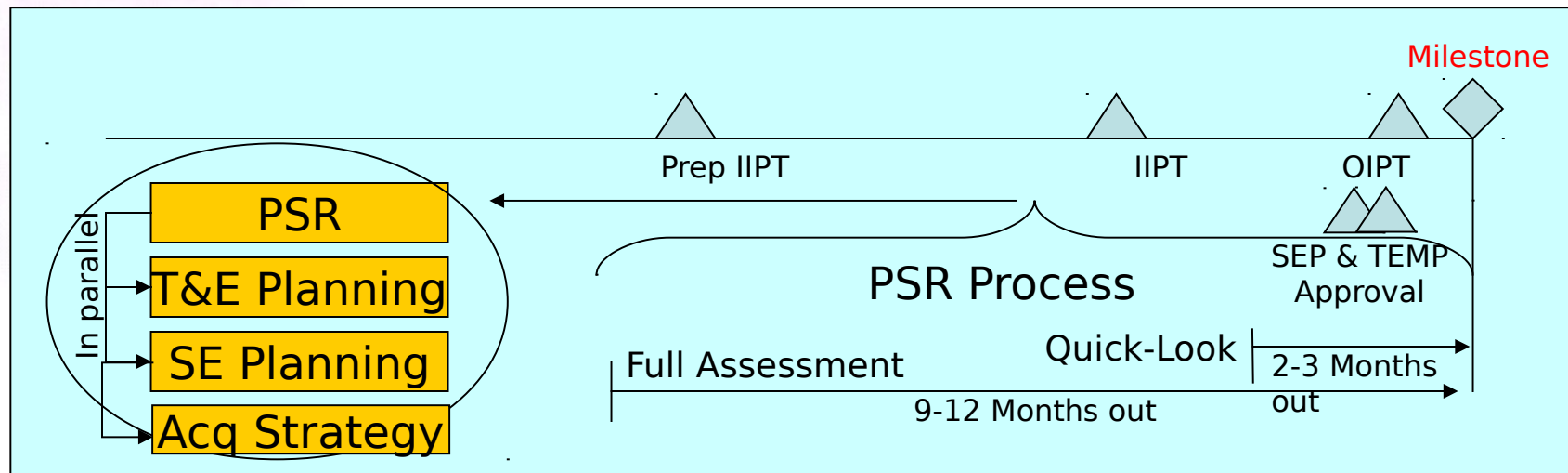
- Issued Systems Engineering (SE) policy
- Issued guidance on SE and Test & Evaluation (T&E)
- Integrating Developmental T&E with SE policy and assessment functions – focused on effective, early engagement of both
- Instituted system-level assessments in support of OSD major acquisition program oversight role
- Established SE Forum – senior-level focus within DoD
- Working with Defense Acquisition University to revise SE, T&E, and enabling career fields curricula
- Leveraging close working relationships with industry and academia

Necessary but not sufficient!



General Approach: Program Outreach Review Products

- Full reviews conducted 9-12 months before Milestone
 - Detailed findings, risks & actionable recommendations
 - Conducted in “PM support” vice “OSD oversight” mode
- “Quick-Look” reviews conducted 2-3 months before Milestone
 - Same form and formats as full assessment; conducted “for record” review
- Quarterly Defense Acquisition Executive Summary (DAES) assessments inputs
- Test & Evaluation Master Plan (TEMP) and Systems Engineering Plan (SEP) development and approval





Systems Engineering Plans



DoD Systems Engineering Shortfalls*

- Common failures on acquisition programs include:
 - Inadequate understanding of requirements
 - Lack of systems engineering discipline, authority, and resources
 - Lack of technical planning and oversight
 - Stovepipe developments with late integration
 - Lack of subject matter expertise at the integration level
 - Availability of systems integration facilities
 - Incomplete, obsolete, or inflexible architectures
 - Low visibility of software risk
 - Technology maturity overestimated

Major contributors to poor program performance

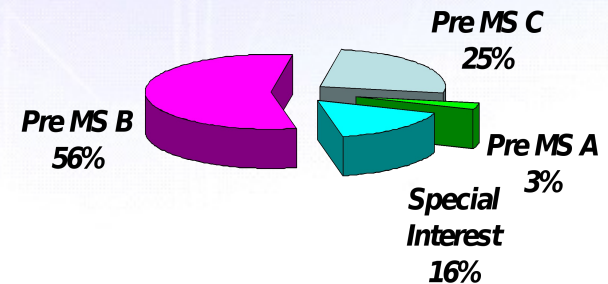
* Findings from PSRs and DoD-directed Studies/Reviews



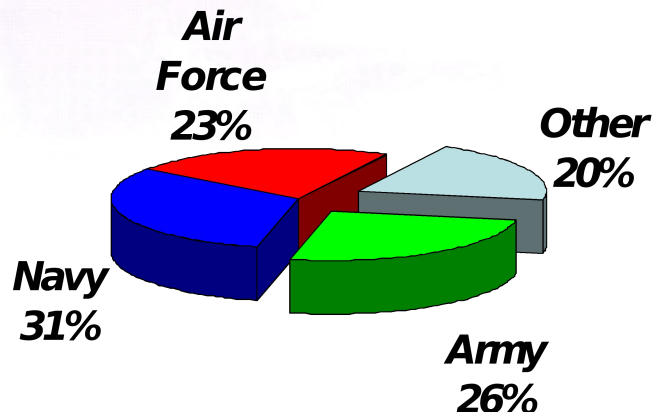
Systems Engineering Plan Activity (since November 2004)

- Number of SEPs reviewed: 59
- Programs submitting SEPs: 36
 - Number of SEPs approved: 8
 - Number of SEPs pending: 5
- Reviews planned for rest of FY06: 103

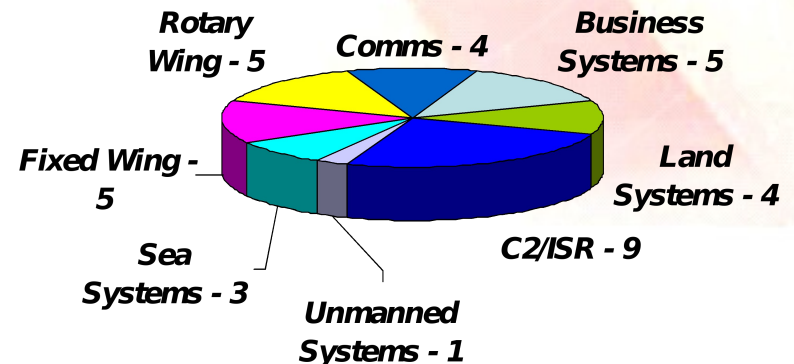
SEP Program Milestones



Component-Managed Acquisitions



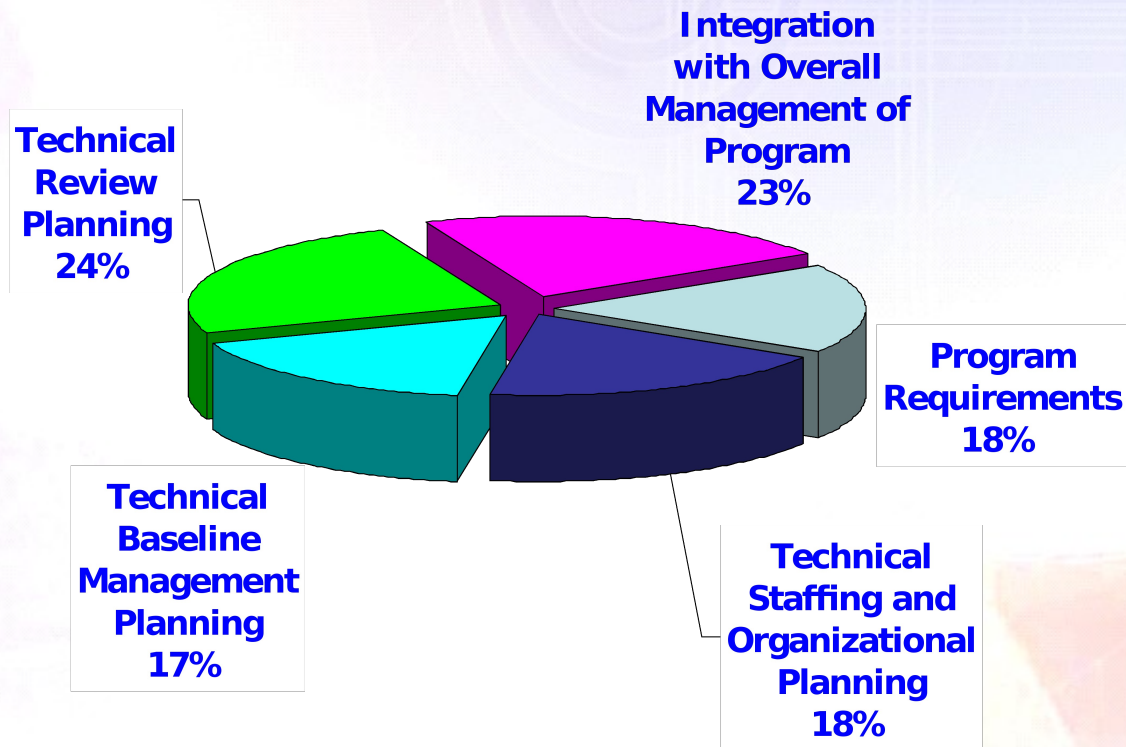
Programs by Product Line





Emerging SEP Comments**

(not systemic across all programs)



****BASED ON ANALYSIS OF 27 OUT OF 39 PROGRAMS**



Program Support



General Review Areas

ASSESSMENT METHODOLOGY FOR PRE-MILESTONE C

1.0	Mission Capabilities/Requirements Assessment Area	4
	Sub-Area 1.1 - Operational Requirements	4

2.0 ASSESSMENT METHODOLOGY FOR PRE-MILESTONE B

1.0	Mission Capabilities/Requirements Assessment Area	4
	Sub-Area 1.1 - Operational Requirements	4

3.0 2.0 ASSESSMENT METHODOLOGY FOR PRE-MILESTONE A

	1.0	Mission Capabilities/Requirements Assessment Area	4
		Sub-Area 1.1 - Operational Requirements	4
	2.0	Resources Assessment Area	9
	3.0	Sub-Area 2.1 - Program Planning and Allocation	9
		Sub-Area 2.2 - Personnel	10
		Sub-Area 2.3 - Facilities	12
		Sub-Area 2.4 - Engineering Tools	13
4.0	3.0	Management Assessment Area	16
		Sub-Area 3.1 - Acquisition Strategy/Process	16
		Sub-Area 3.2 - Project Planning	19
	4.0	Sub-Area 3.3 - Program and Project Management	21
		Sub-Area 3.4 - Contracting and Subcontracting	26
		Sub-Area 3.5 - Communication	28
	4.0	Technical Process Assessment Area	30
		Sub-Area 4.1 - Technology Assessment and Transition	30
		Sub-Area 4.2 - Requirements Development	31
		Sub-Area 4.3 - Functional Analysis & Allocation	32
		Sub-Area 4.4 - Design Synthesis	33
		Sub-Area 4.5 - System Integration, Test and Verification	35
		Sub-Area 4.6 - Transition to Deployment	37
		Sub-Area 4.7 - Process Improvement	38
	5.0	Technical Product Assessment Area	38
		Sub-Area 5.1 - System Description	38
		Sub-Area 5.2 - System Performance	42
		Sub-Area 5.3 - System Attributes	43
	6.0	Environment Assessment Area	44
		Sub-Area 6.1 - Statutory and Regulatory Environment	45

<http://www.acq.osd.mil/ds/se>

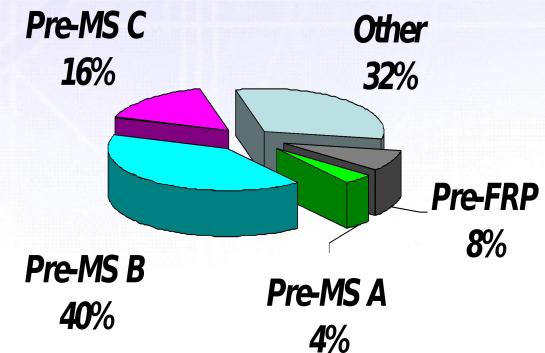
Program Support Review Activity

(since March 2004)

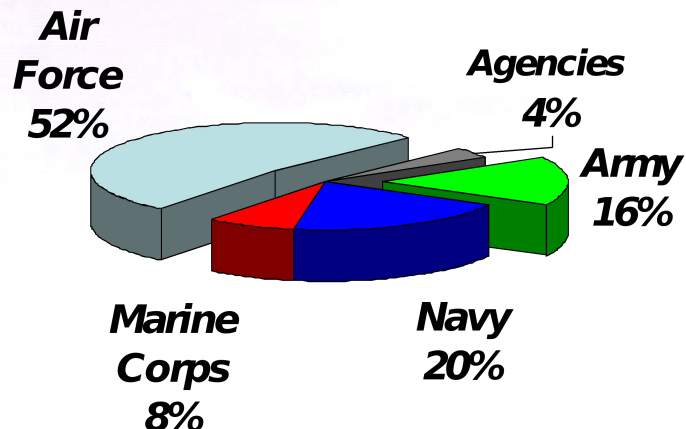


- Number of PSRs completed: 25
- Number of AOTRs completed: 4
- Reviews planned for rest of FY06
 - PSRs: at least 24
 - AOTRs: 2

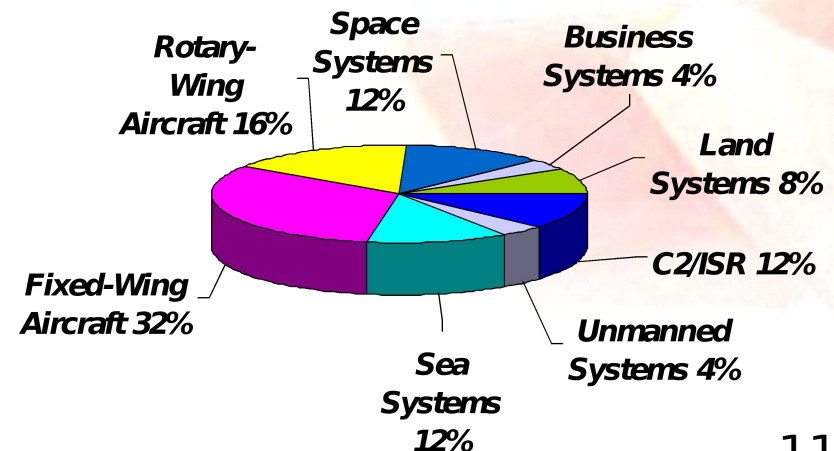
Reviews Conducted Prior to Each Milestone



Service-Managed Acquisitions



Programs by Product Line





Samples of Program Support Review “Strengths”

- Experienced and dedicated program office teams
- Strong teaming between prime contractors, sub-contractors, program offices and engineering support
- Use of well defined and disciplined SE processes
- Proactive use of independent review teams
- Successful management of external interfaces
- Corporate commitment to process improvement
- Appropriate focus on performance-based logistics
- Notable manufacturing processes
- Focus on DoD initiatives
- Excellent risk management practices

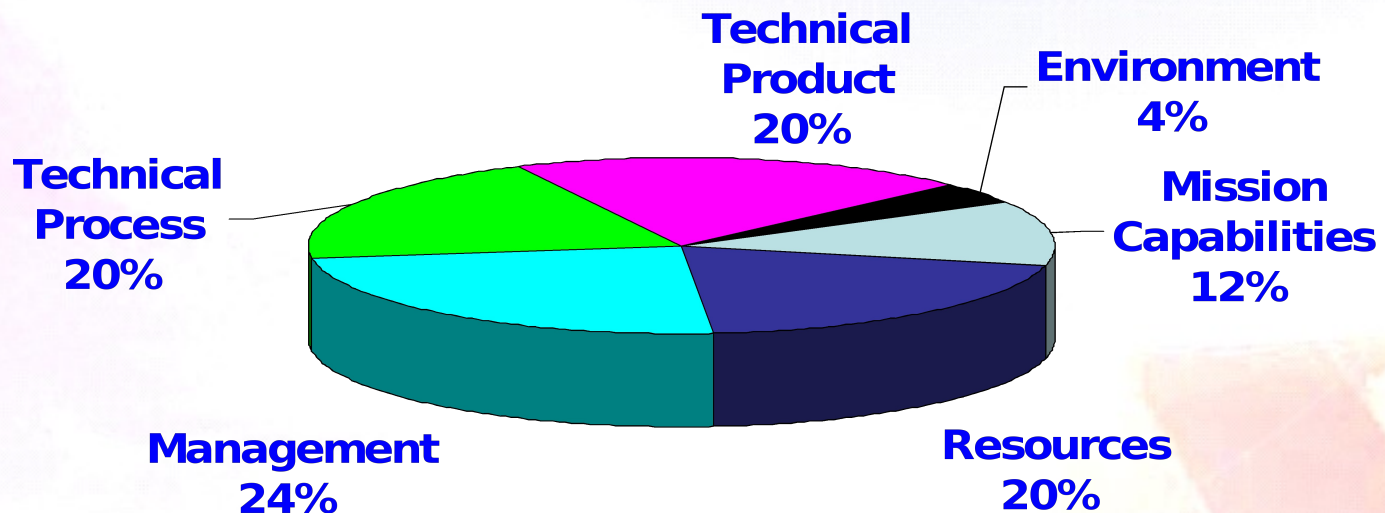
But not on all Programs...



Emerging Program Support Findings**

(not systemic across all programs)

- Findings across the 6 general review areas...
(based on assessment methodology areas)



****BASED ON ANALYSIS OF 14 OUT OF 22 REVIEWS**

Driving Technical Rigor Back Into Programs

“How PMs are reacting to PSR recommendations?”



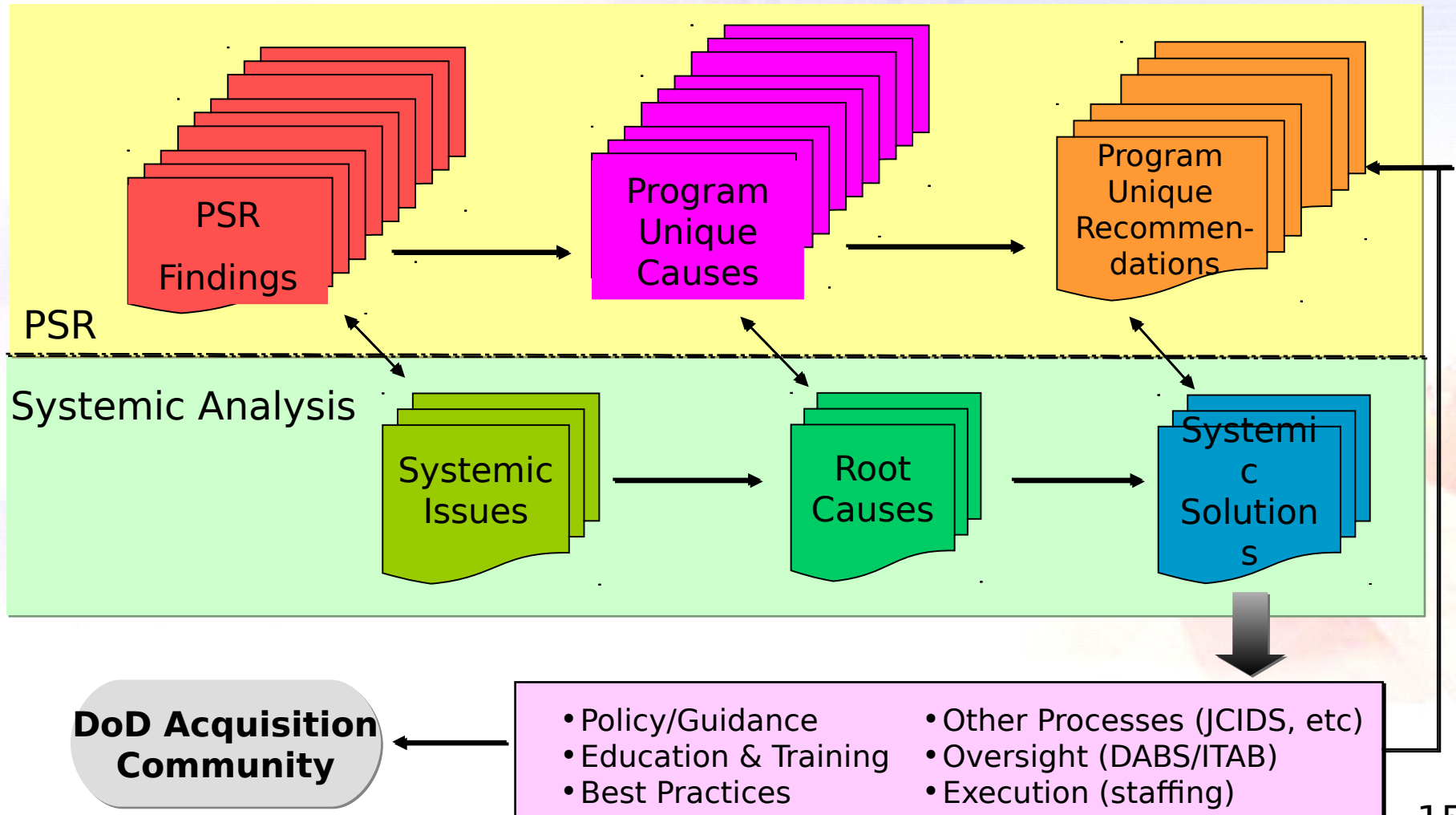
- Mission Capabilities - Requirements
 - User requirements not fully defined and/or in flux
 - ☒ Established requirements management plan with all stake holders, including proactive plan for Net-Ready KPP
- Resources - Personnel
 - Experienced, dedicated PM office staff, but stretched too thin
 - ☒ Expanded, empowered WIPT to bring in technical authority SMEs, users, and DCMA
- Management - Schedule Adequacy
 - Technical review planning demonstrated schedule was high risk
 - ☒ Lengthen schedule to include full suite of SE technical reviews, supported by adjusted program funding
- Technical Process - Test & Evaluation
 - Insufficient reliability growth program to meet user requirements by IOT&E
 - ☒ Increased the number of test articles and added sub-system level test events
- Technical Product - Supportability/Maintainability
 - Logistics demonstration plan just prior to IOT&E
 - ☒ Demonstration re-scheduled prior to MS C

Better than 90% acceptance of recommendations



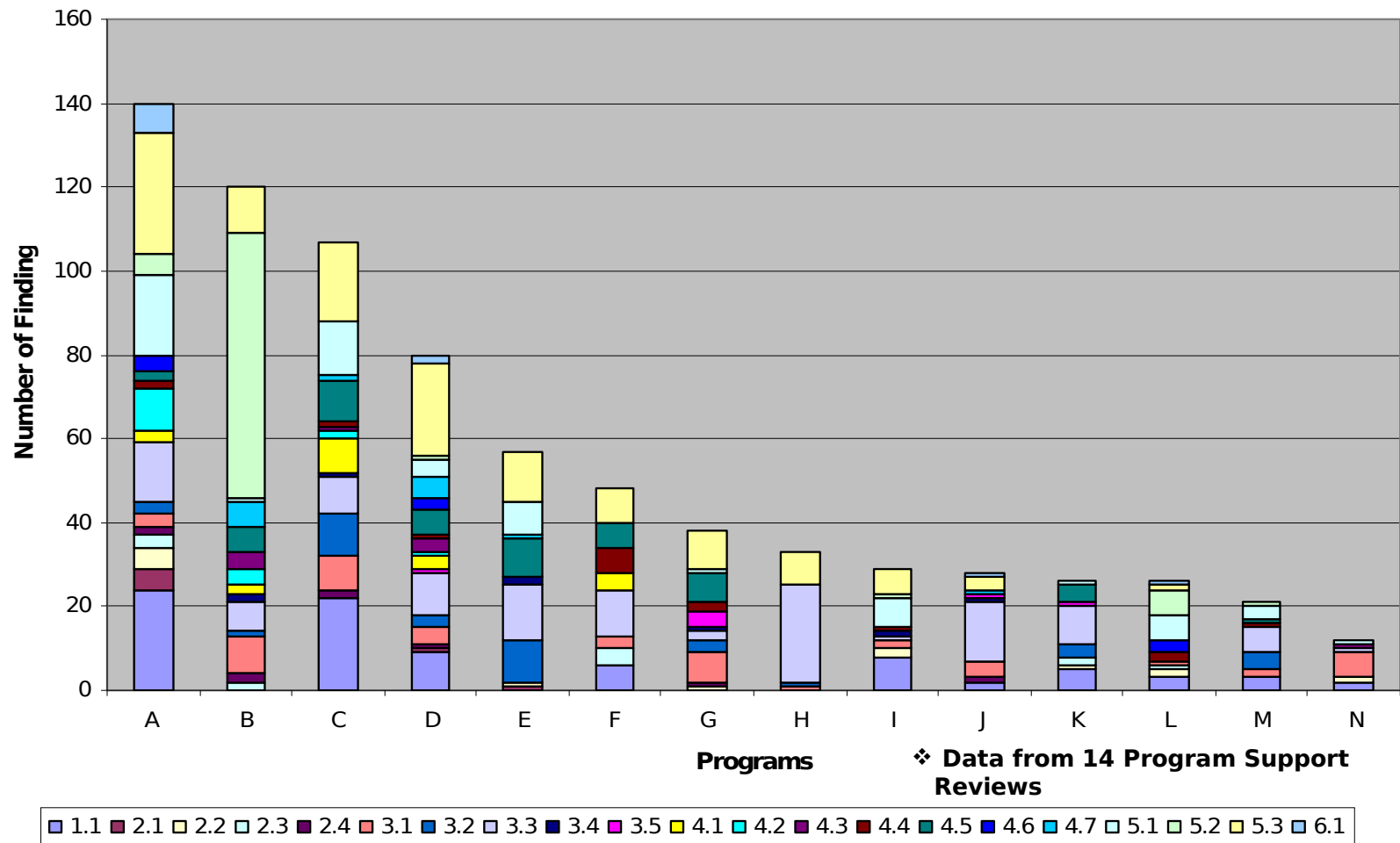
Systemic Analysis Perspective

“How do we find solutions to the systemic problems?”





Number and Type of Findings by Program

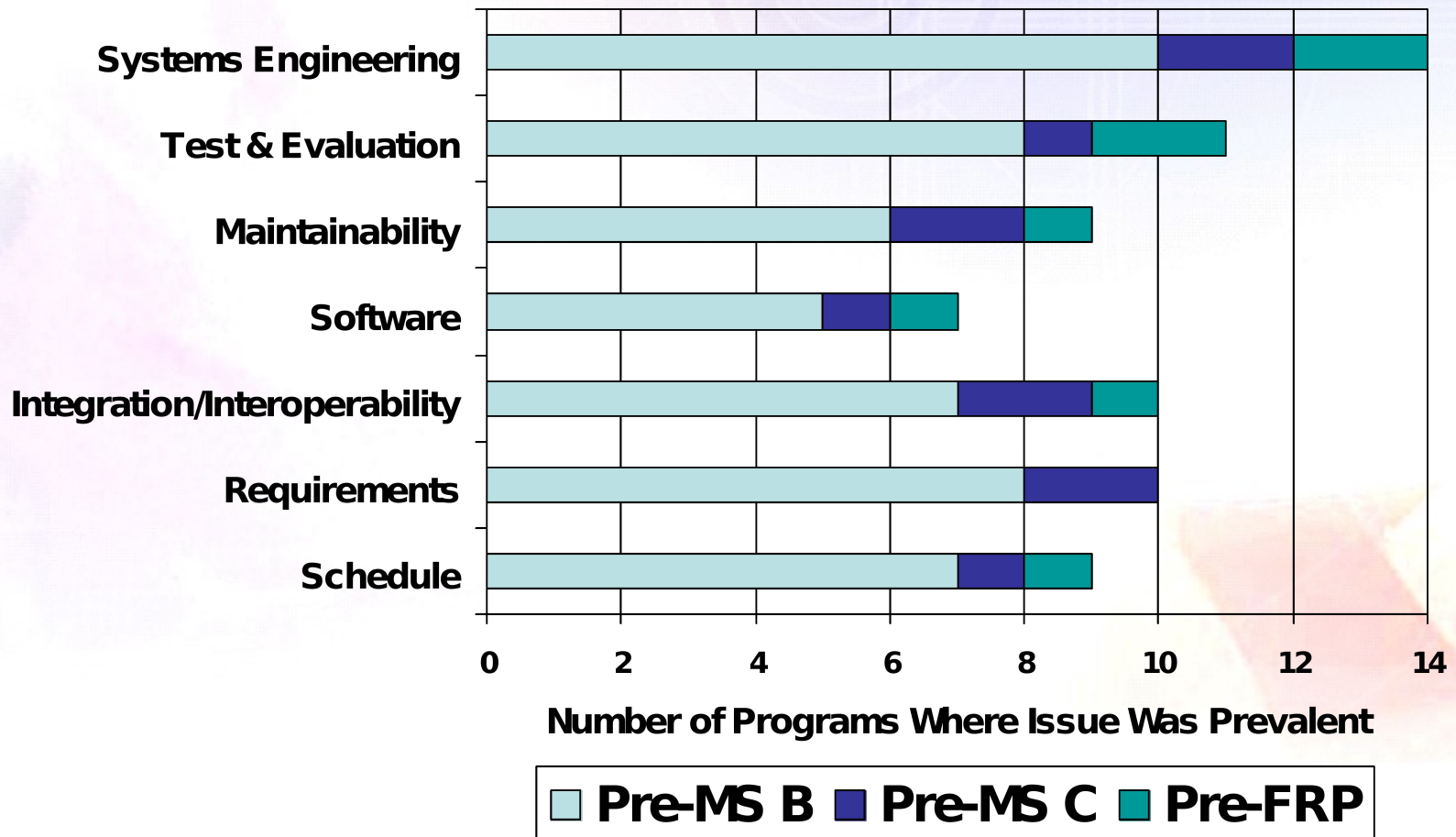


Numbers represent sections of the PSR Methodology



Systemic Analysis Perspective

“What are the systemic problem areas





Representative Issues

(1 of 3)

- **Representative Issues for Schedule**
 - Schedules too aggressive
 - Detailed schedules missing key components
 - Schedule concurrency (e.g. T&E activities)
- **Representative Issues for Requirements**
 - Requirements don't support planned modifications, increasing capacity
 - Requirements changed without consideration or coordination with PM/PO and dependent programs
 - "Shortsighted" requirements, i.e. safety critical, bandwidth to support future capabilities
- **Representative Issues for Integration/Interoperability**
 - Integration plans lacking key components
 - Multi-platform, scalable design benefits not realized due to low hw/sw commonality
 - Interoperability with Joint Forces not adequately addressed



Representative Issues

(2 of 3)

- **Representative Issues for Software**
 - Software processes not institutionalized
 - Software development planning doesn't adequately capture lessons learned to incorporate into successive builds
 - Systems and spiral software requirements undefined
 - Software architecture immature
 - Software reuse strategies are inconsistent across programs
 - Software support plan missing
- **Representative Issues for Maintainability**
 - Maintainability requirements incomplete or missing
 - Diagnostic effectiveness measures are either too ambiguous or missing
 - Tailoring out of criticality calculations translates to inability to monitor the maintainability status of reliability critical items



Representative Issues

(3 of 3)

- **Representative Issues for Test and Evaluation**
 - No reliability details (hours, profile, exit criteria, confidence level, OC curve)
 - Lack metrics
 - Basis for some threat-based requirements not fully explained or rationalized
- **Representative Issues for Systems Engineering**
 - Lack of disciplined SE process, metrics, etc
 - PO not conducting PRR prior to LRIP
 - Missing Joint CONOPs
 - Missing System Functional Review (SFR) and PDR during SDD



Summary

- We are working to meet the Under Secretary's imperatives in support of transformation by:
 - Providing a context for decisions
 - Putting credibility into the acquisition process
 - Driving systems engineering back into programs
- Our ultimate goal in conducting PSRs is to help all programs achieve mission success through:
 - Early and persistent application of SE
 - Event-driven technical reviews and test programs



Questions...perhaps Answers

